Automobile Insurance Losses
Personal Injury Protection and Collision Coverages

COMPARISONS OF THE LOSS EXPERIENCE OF TWO- AND FOUR-DOOR CARS 1978, 1979, AND 1980 MODELS

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Highway Loss Data Institute
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Summary

This report analyzes differences in the injury and collision* loss experience between two- and four-door cars. In particular, it examines the influence of three non-vehicle factors – insured driver age, vehicle density of the garaging location, and vehicle use – to determine whether they contribute to the repeatedly documented differences in loss experience between these two body styles.

Results were based on the personal injury protection and collision coverage experience of four popular cars that were marketed in two- and four-door versions. Injury results are presented for 1978 and 1979 models and collision results for 1978-1980 models.

Principal Findings

- In virtually every loss category two-door cars had worse experiences than corresponding four-door cars. These differences were most pronounced for the collision coverage results, but were also present for most of the injury results. There was no evidence that the non-vehicle factors studied were significantly contributing to these differences.

- Although driver age had a strong influence on the results, it did not account for most of the differences in loss experience between the two car body styles.

- Vehicle density and vehicle use also influenced the results but did not contribute to the differences in loss experience by body style.

* In this report, the term *collision* refers to the particular type of insurance sold as "Collision" coverage.

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Introduction

The Highway Loss Data Institute (HLDI) is a non-profit, public service organization that gathers, analyzes, and publishes insurance data concerned with the human and economic losses associated with motor vehicle use, and, especially with the ways such losses vary among different kinds of vehicles.

The results of many previously published HLDI reports indicate that both injury and collision coverage losses tend to be greater for the two-door passenger cars than for the corresponding four-door models. This report analyzes in detail differences in loss experience by body style. In particular, it examines the influence of three non-vehicle factors – insured driver age group, vehicle density of the garaging location, and vehicle use – on the loss experience of corresponding two- and four-door models and considers whether these factors, either singly, or, in combination, contribute to the reported differences in loss experience between body styles.

The results of this study are based on personal injury protection (PIP) and collision coverage and loss data supplied by ten insurers: Aetna, Allstate, GEICO, Kemper, Liberty Mutual, Nationwide, Prudential, State Farm, Travelers, and USAA. A description of the sources and nature of the data is presented in Appendix B. The data analysis methods used in the preparation of this report are detailed in Appendix C. Definitions are provided in Appendix D.

It is intended that the dissemination of this and other HLDI reports will contribute to research into ways for reducing vehicle-related damage to people and property, and also provide the public with information relating to the differences in the crash damage produced by different kinds of vehicles.

Results and Discussion

This report is based on injury and collision coverage results from four popular cars that were marketed with both two- and four-door versions. It summarizes the effects of three non-vehicle factors – insured driver age group, vehicle density of the garaging location, and vehicle use – on the loss experience.

The four popular passenger cars whose insurance loss experience form the basis of this report are the Chevrolet Chevette, Chevrolet Malibu, Ford Fairmont, and Plymouth Horizon*. Injury results are presented for 1978 and 1979 models and collision results are presented for 1978, 1979, and 1980 models. To ensure that differences in the mix of exposure among the four cars within each body style were not distorting comparisons between the two body styles, the results were standardized so that the mix of exposure from each of the four cars was the same for the two- and four-door results (see Appendix C for details).

Operator Age Groups

One non-vehicle factor that might contribute to the reported body style differences in loss experience is the driver rated as the principal operator for insurance purposes. Two-door models consistently have more exposure with younger operators than corresponding four-door models and HLDI results are standardized to eliminate the effects of operator age group differences. The influence of driver age, however, might not be totally eliminated because HLDI analyses use only two driver age groups and there could be differences in the age distributions within each of the age groups. Younger drivers have more frequent and severe crashes than older drivers; hence, if two-door models have a significantly greater percentage of their exposure among the very youngest drivers within the youthful operator group, this could result in their higher reported losses.

Tables 1 and 2 present detailed distributions of exposure by body style for five driver age groups within the two principal operator age groups. These five classes represent as small an age grouping as possible with the HLDI data. Tables 1 and 2 show that two-door models had a greater percentage of their exposure than four-door models in each of the subgroups within the youthful operator group; however, this difference was smallest for the youngest operator age group – drivers aged 17-20. Thus, the poorer loss experience of two-door cars is not likely to be attributable to differences in the mix of ages within the youthful operator age group, since the operator group which generally has the worst loss experience – drivers aged 17-20 – had the smallest excess of exposure for two-door models.

Table 3 shows the injury loss experience by body style for four of the five operator age groups. Results are not presented for the "all other youthful" driver age group since neither the two-door nor the four-door models had sufficient exposure to meet the reporting threshold of 5,000 insured vehicle years. It is clear from these results that operator age has a strong influence on injury loss experience. The youngest operators had the worst injury experience in the overall injury claim size category and the oldest operators had the best. The results also show there were consistent differences in loss experience by body style. In each operator age group, two-door models had higher overall injury loss results than four-door models. The percentage differences between the results for the two body styles tended to decrease for the claims which exceeded $500.

Table 4 and Figures 1 through 3 show the collision coverage loss experience by body style for each of the five operator age groups. As in the case of the injury results, there were very strong relationships between the collision coverage results and driver age. As before, the youngest operators had the worst results while the oldest had the best. *(cont'd on page 11)*

*Results for the Plymouth Horizon are presented for the 1979 and 1980 model years only since the two-door model was not produced in the 1978 model year.

Table 1
Personal Injury Protection Coverages
Mix of Exposure by Operator Age Group and Body Style
1978-1979 Models

	Operator Age Group	Body Style	Exposure (Insured Vehicle Years)	Percentage of Exposure	Ratio of 2Dr:4Dr Exposure
Youthful Operator	17-20	2 Dr. 4 Dr.	17,019 13,655	8.3 6.7	1.2
	21-24	2 Dr. 4 Dr.	18,145 9,476	8.8 4.6	1.9
	All Other Youthful	2 Dr. 4 Dr.	4,311 2,082	2.1 1.0	2.1
No Youthful Operator	25-64	2 Dr. 4 Dr.	157,241 164,082	76.4 80.2	1.0
	⩾ 65	2 Dr. 4 Dr.	9,208 15,159	4.5 7.4	0.6
	Total	2 Dr. 4 Dr.	205,924 204,454	100.0 100.0	

NOTES:

- Results are based on the loss experience of the following 1978-1979 two- and four- door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

Table 2
Collision Coverages
Mix of Exposure by Operator Age Group and Body Style
1978-1980 Models

	Operator Age Group	Body Style	Exposure (Insured Vehicle Years)	Percentage of Exposure	Ratio of 2Dr:4Dr Exposure
Youthful Operator	17-20	2 Dr. 4 Dr.	45,801 34,845	8.6 6.7	1.3
	21-24	2 Dr. 4 Dr.	49,140 24,689	9.2 4.7	2.0
	All Other Youthful	2 Dr. 4 Dr.	9,732 4,791	1.8 0.9	2.0
No Youthful Operator	25-64	2 Dr. 4 Dr.	404,431 416,413	75.8 80.0	0.9
	≥65	2 Dr. 4 Dr.	24,272 39,938	4.6 7.7	0.6
	Total	2 Dr. 4 Dr.	533,376 520,676	100.0 100.0	

NOTES:

- Results are based on the loss experience of the following 1978-1980 two- and four- door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

Table 3
Personal Injury Protection Coverages
Claim Frequency Results by Operator Age Group and Body Style
1978-1979 Models

	Operator Age Group	Body Style	Claim Frequency by Size of Claim (Per 1000 Insured Vehicle Years)			
			All	> $250	>$500	> $1000
Youthful Operator	17-20	2 Dr.	33.4	13.0		
		4 Dr.	28.3	10.2		
	21-24	2 Dr.	24.1			
		4 Dr.	23.8			
	All Other Youthful	2 Dr.				
		4 Dr.				
No Youthful Operator	25-64	2 Dr.	18.9	7.7	4.7	2.9
		4 Dr.	16.9	6.8	4.3	2.7
	≥65	2 Dr.	13.5			
		4 Dr.	13.0			

NOTES:

- Minimum exposure thresholds for reporting:

All claims	5,000 vehicle years
Claims >$250	10,000 vehicle years
Claims >$500	15,000 vehicle years
Claims >$1000	25,000 vehicle years

- Results are based on the loss experience of the following 1978-1979 two- and four-door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

- All results are standardized, see Appendix C for details.

Table 4
Collision Coverages
Loss Results by Operator Age Group and Body Style
1978-1980 Models

	Operator Age Group	Body Style	Claim Frequency Per 100 Insured Vehicle Years	Average Loss Payment Per Claim	Average Loss Payment Per Insured Vehicle Year
Youthful Operator	17-20	2 Dr.	16.4	$1160	$191
		4 Dr.	13.6	1095	149
	21-24	2 Dr.	12.1	1054	128
		4 Dr.	11.0	1076	119
	All Other Youthful	2 Dr.	12.2	1158	139
		4 Dr.	11.2	1100	123
No Youthful Operator	25-64	2 Dr.	8.4	988	84
		4 Dr.	7.8	924	72
	≥65	2 Dr.	7.5	887	68
		4 Dr.	6.8	856	59

NOTES:

- Results are based on the loss experience of the following 1978-1980 two- and four-door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.
- All results are standardized; see Appendix C for details.

Figure 1
Collision Coverages
Claim Frequency Results by Operator Age Group and Body Style
1978-1980 Models

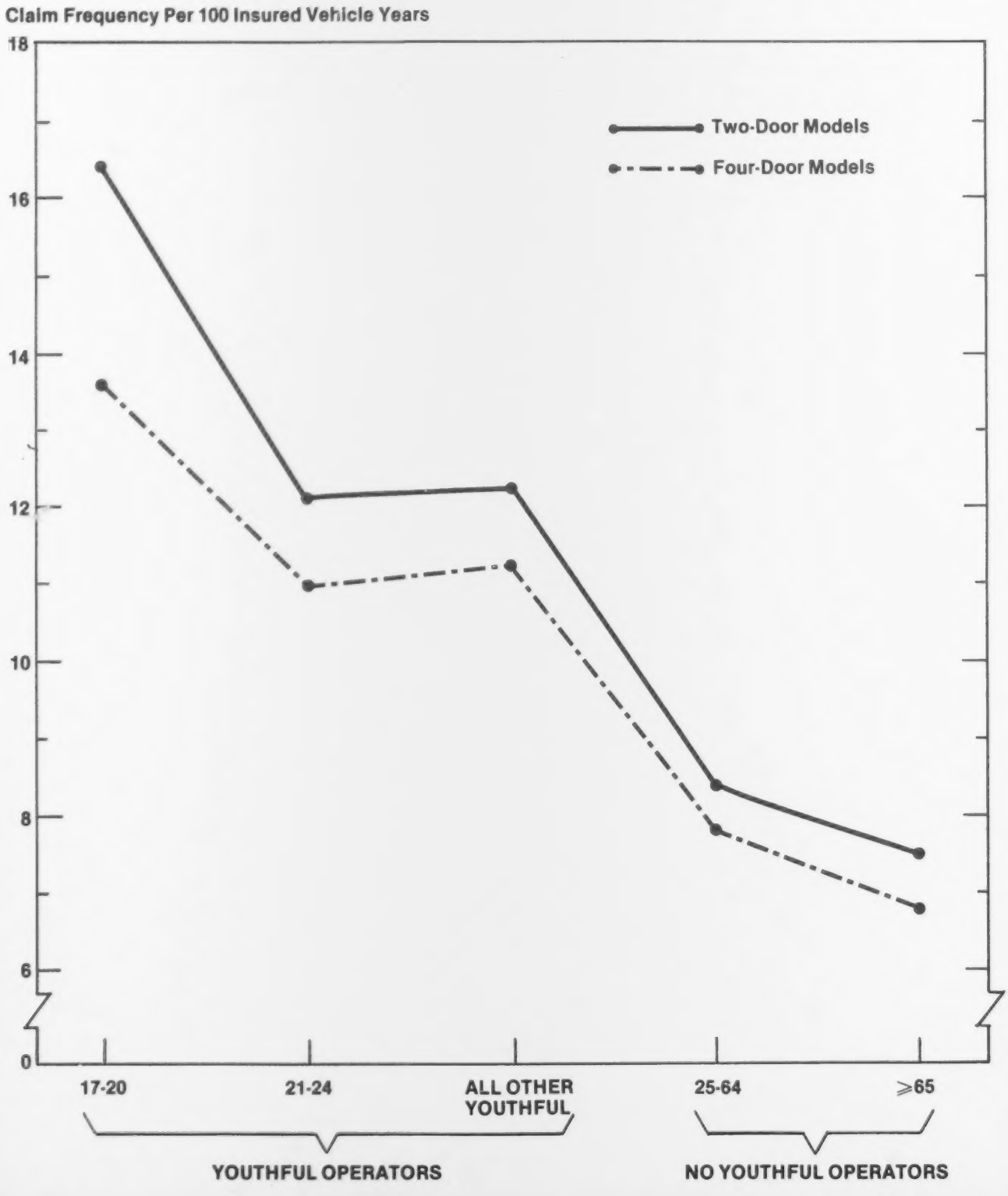


Figure 2
Collision Coverages
Average Loss Payment Per Claim by Operator Age Group and Body Style
1978-1980 Models

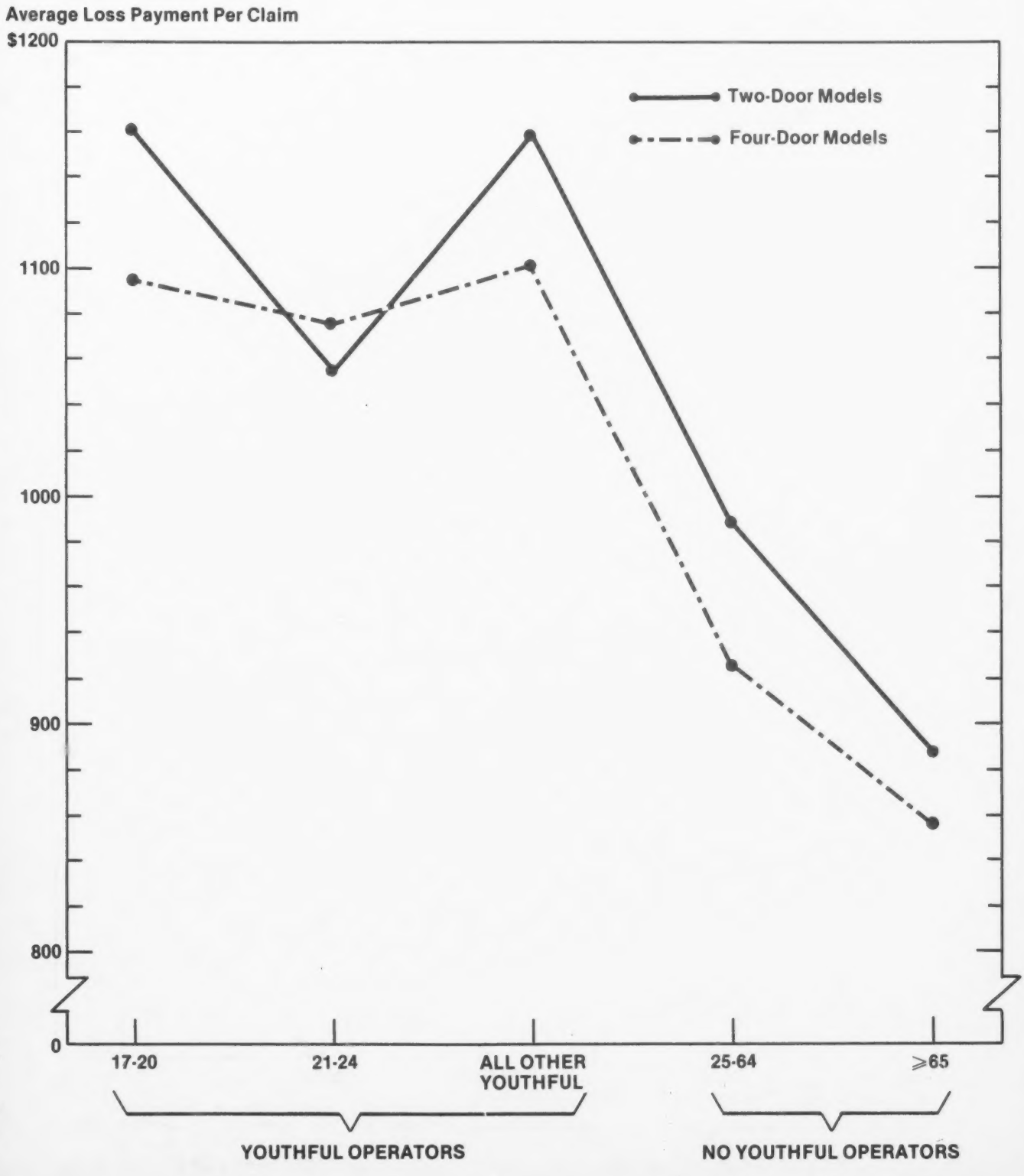
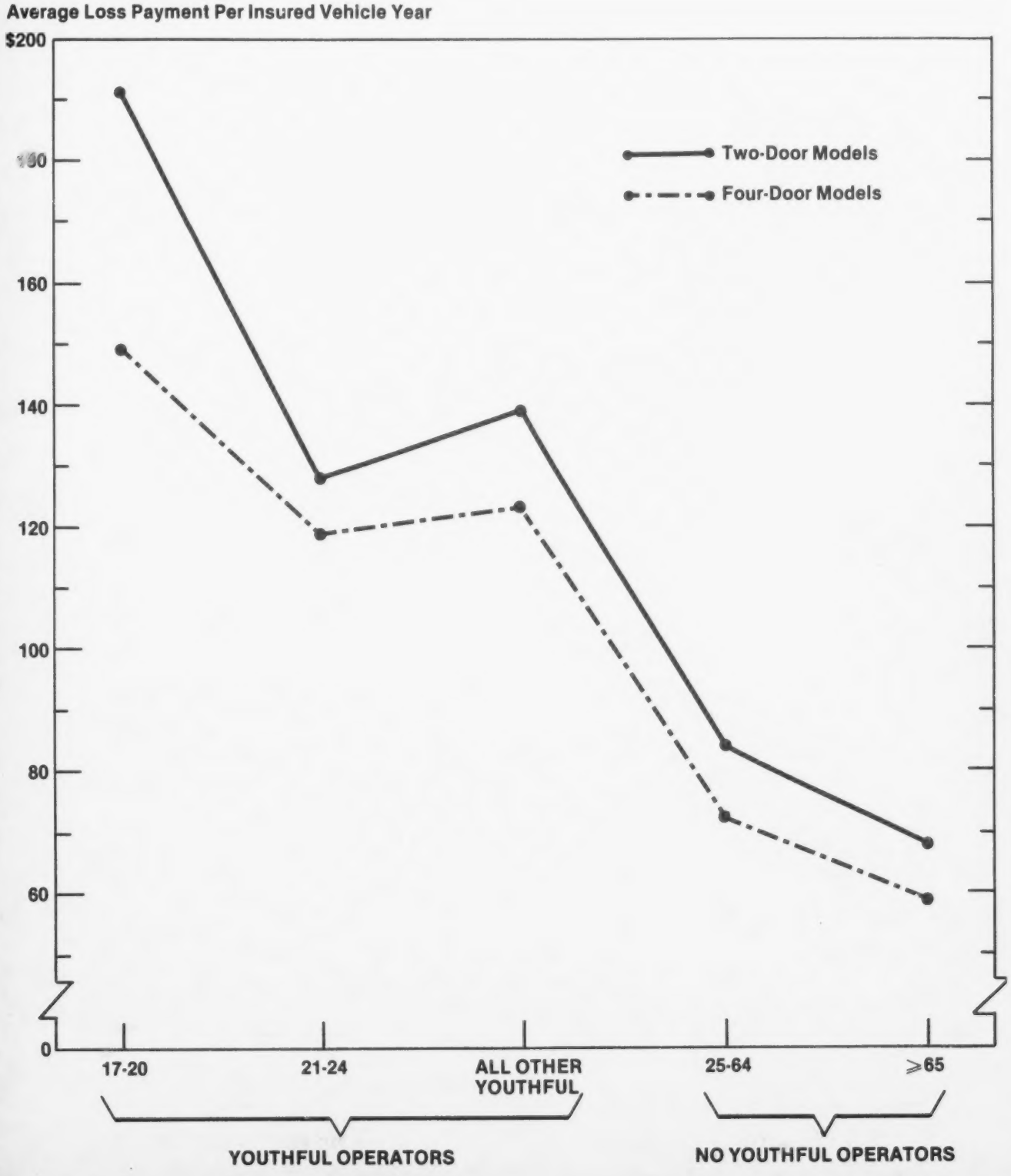


Figure 3
Collision Coverages
Average Loss Payment Per Insured Vehicle Year by Operator Age Group and Body Style
1978-1980 Models



Like the injury coverage results, there were also very consistent differences in the results between the two body styles. Each result in every operator age group, with the single exception of the average loss payment results for 21-24 year old operators, was lower for the four-door models.

Similar results are reflected in the comparisons of collision loss results for individual models in Appendix A1. In most cases, for each age group, two-door models had greater losses than corresponding four-door models. Again, the major exceptions were for drivers aged 21-24. Among this age group, collision coverage average loss payments per claim were generally higher for four-door models.

The loss results by operator age group strongly suggest that driver age differences are not a significant factor in the differences in the results by body style. For drivers of the same age, two-door models consistently had higher overall injury losses as well as higher collision losses. These differences between results for the two body styles were most pronounced for the 17-20 year old age group. It should be noted, however, that within particular age groups, there still could be some variations by age, sex, and marital status. Since operator age is such an important determinant of loss experience and because there are differences between the two body styles in the mix of exposure by operator age group, it is important that results be standardized for this factor. All subsequent results in this report were standardized so that there was the same mix of exposure for each of the five age groups contributing to each two- and four-door result.

Vehicle Density

Another non-vehicle factor that can influence loss experience is a vehicle's normal garaging location. Previous HLDI reports* indicated that the number of registered passenger vehicles per square mile in the reported garaging locations of vehicles influenced the collision coverage loss experience. Although there was a slight tendency for vehicles of particular size classes to be associated with garaging locations in particular density groups, these differences were not marked and were not significantly distorting comparisons among vehicle types.

Tables 5 and 6 show that the distribution of exposure by vehicle density did not vary substantially between body style groups. Four-door models, though, did have slightly more exposure in low density areas than two-door models.

Table 7 and Figure 4 summarize the injury loss experience by vehicle density and body style. The relationships between vehicle density and injury claim frequency were not pronounced, but for every claim size category the injury claim frequency results were highest in the areas of greatest vehicle density. This table and figure also show that in all vehicle densities four-door models had lower overall injury claim frequencies than two-door models. Body style differences in loss experience, however, were not as consistent for the other injury claim size categories.

Table 8 and Figures 5 through 7 summarize the collision coverage loss experience by vehicle density and body style. Claim frequency results *increased*, but average payment per claim results *decreased* with increasing density. In every instance the two-door results were worse than the four-door results.

Appendices A2 and A3 present the loss experience results of each corresponding two-door and four-door model. In most cases, the two-door models had worse loss results than the four-door models.

(cont'd on page 19)

*Automobile Insurance Losses, Collision Coverages, Relationships Between Losses and Vehicle Density, 1972 and 1973 Models, September 1974.

*Automobile Insurance Losses, Collision Coverages, Relationships Between Losses and Vehicle Density, 1974 and 1975 Models, December 1975.

Table 5
Personal Injury Protection Coverages
Mix of Exposure by Vehicle Density and Body Style
1978-1979 Models

Vehicle Density	Body Style	Exposure (Insured Vehicle Years)	Percentage of Exposure
0-50 Vehicles Per Square Mile	2 Dr.	60,414	29
	4 Dr.	64,317	32
51-600 Vehicles Per Square Mile	2 Dr.	85,061	41
	4 Dr.	83,034	41
> 600 Vehicles Per Square Mile	2 Dr.	60,449	29
	4 Dr.	57,104	28
Total	2 Dr.	205,924	100
	4 Dr.	204,454	100

NOTES:

- Results are based on the loss experience of the following 1978-1979 two- and four-door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

Table 6
Collision Coverages
Mix of Exposure by Vehicle Density and Body Style
1978-1980 Models

Vehicle Density	Body Style	Exposure (Insured Vehicle Years)	Percentage of Exposure
0-50 Vehicles Per Square Mile	2 Dr.	180,108	34
	4 Dr.	187,207	36
51-600 Vehicles Per Square Mile	2 Dr.	204,734	38
	4 Dr.	195,613	38
> 600 Vehicles Per Square Mile	2 Dr.	148,534	28
	4 Dr.	137,856	26
Total	2 Dr.	533,376	100
	4 Dr.	520,676	100

NOTES:

- Results are based on the loss experience of the following 1978-1980 two- and four- door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

Table 7
Personal Injury Protection Coverages
Claim Frequency Results by Vehicle Density and Body Style
1978-1979 Models

Vehicle Density	Body Style	Claim Frequency by Size of Claim (per 1000 Insured Vehicle Years)			
		All	> $250	> $500	> $1000
0-50 Vehicles Per Square Mile	2 Dr.	19.6	7.8	4.8	2.9
	4 Dr.	16.9	6.6	4.1	2.6
51-600 Vehicles Per Square Mile	2 Dr.	19.9	7.7	4.6	2.7
	4 Dr.	18.6	7.3	4.7	2.8
>600 Vehicles Per Square Mile	2 Dr.	22.6	9.4	6.1	3.7
	4 Dr.	20.7	8.6	5.5	3.1

NOTES:

- Minimum exposure thresholds for reporting:

All claims	5,000 vehicle years
Claims >$250	10,000 vehicle years
Claims >$500	15,000 vehicle years
Claims >$1000	25,000 vehicle years

- Results are based on the loss experience of the following 1978-1979 two- and four-door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

- All results are standardized, see Appendix C for details.

Figure 4
Personal Injury Protection Coverages
Claim Frequency Results by Vehicle Density and Body Style
1978-1979 Models

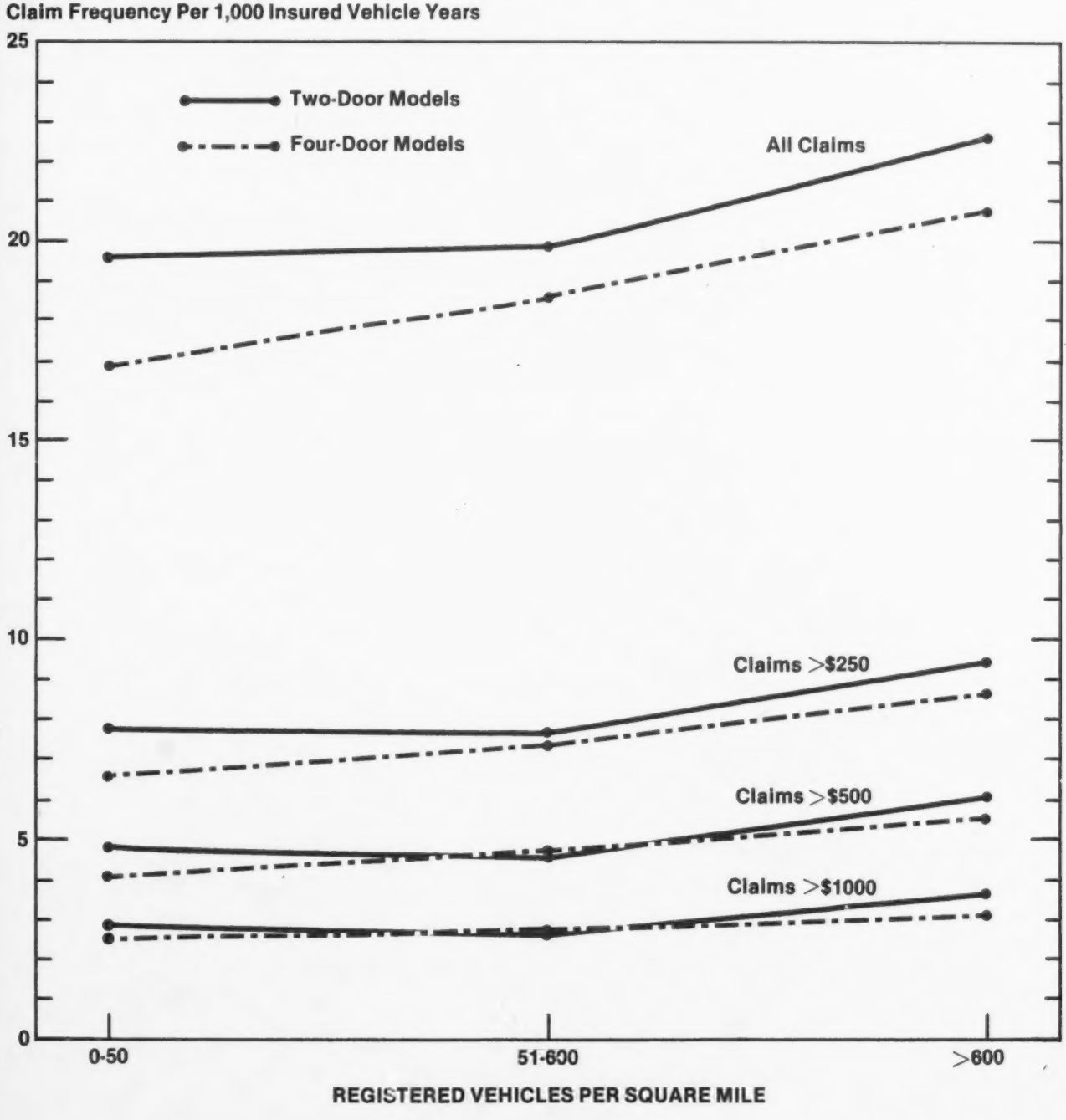


Table 8
Collision Coverages
Loss Results by Vehicle Density and Body Style
1978-1980 Models

Vehicle Density	Body Style	Claim Frequency Per 100 Insured Vehicle Years	Average Loss Payment Per Claim	Average Loss Payment Per Insured Vehicle Year
0-50 Vehicles Per Square Mile	2 Dr.	8.9	$1070	$98
	4 Dr.	7.9	991	81
51-600 Vehicles Per Square Mile	2 Dr.	9.3	1007	95
	4 Dr.	8.5	967	83
>600 Vehicles Per Square Mile	2 Dr.	11.0	973	108
	4 Dr.	10.1	918	94

NOTES:

- Results are based on the loss experience of the following 1978-1980 two- and four-door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.
- All results are standardized; see Appendix C for details.

Figure 5
Collision Coverages
Claim Frequency Results by Vehicle Density and Body Style
1978-1980 Models

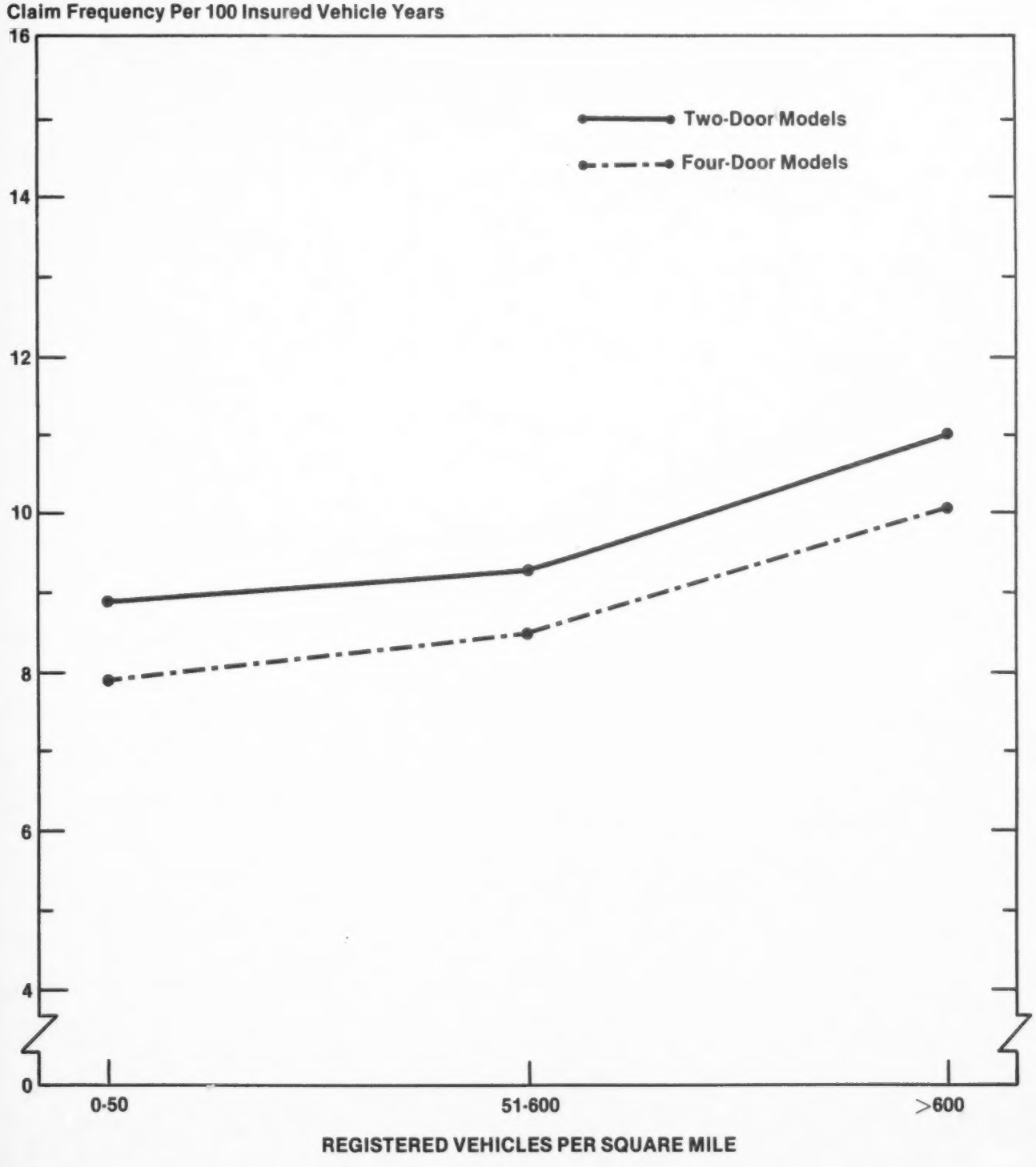


Figure 6
Collision Coverages
Average Loss Payment Per Claim by Vehicle Density and Body Style
1978-1980 Models

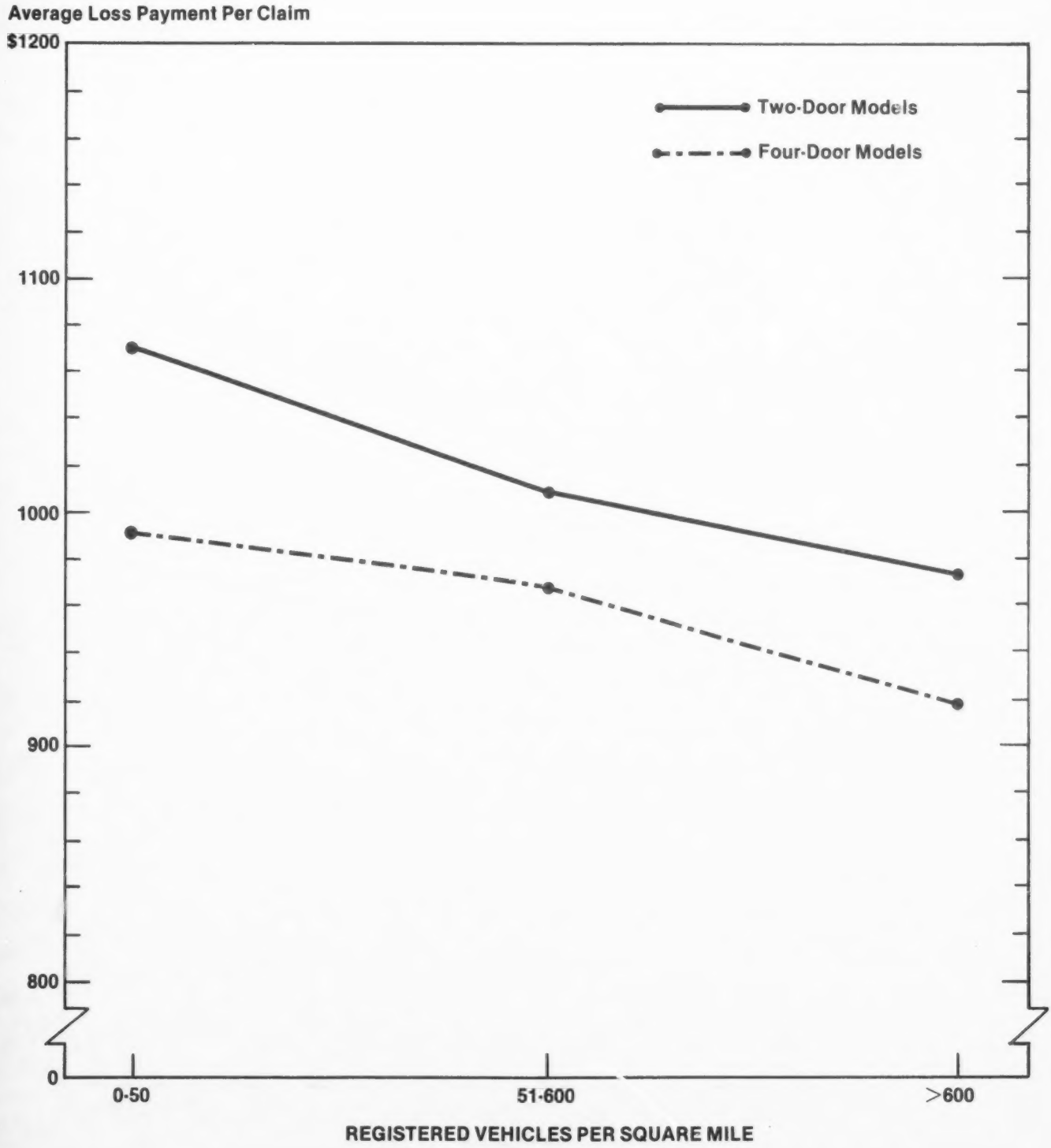
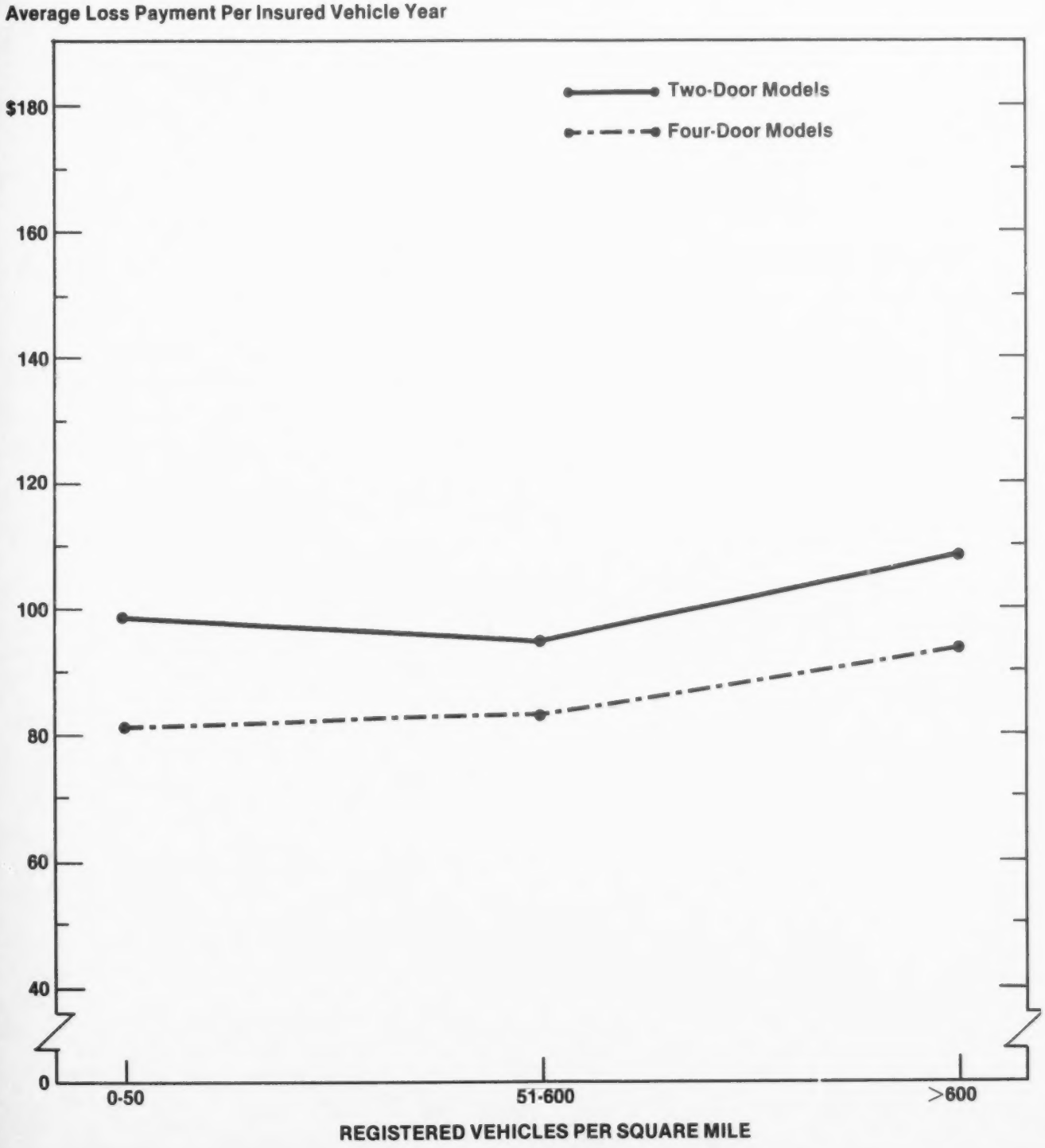


Figure 7
Collision Coverages
Average Loss Payment Per Insured Vehicle Year by Vehicle Density and Body Style
1978-1980 Models



The preceding results by vehicle density, especially the collision coverage results, show that vehicle density differences are not contributing to the differences in loss experience for two- and four-door models.

Vehicle Use

The use of a vehicle can also influence its loss experience. Vehicles used primarily for work or business incur more frequent claims than vehicles operated for pleasure. Thus, if the distribution of exposure between the different use categories varies among individual vehicle series or body style groups, loss results could be affected.

Tables 9 and 10 present the distribution of exposure for two vehicle use groups – pleasure or farm and work or business – for injury and collision coverages. Four-door models had somewhat more of their exposure in the farm or pleasure use category, whereas the distribution of exposure for two-door models was almost equally divided between the use groups.

Table 11 and Figure 8 show the injury loss experience results for the two vehicle use categories by body style. Vehicles insured for business or work use had slightly higher injury claim frequency results in nearly every claim size category than vehicles insured for pleasure or farm use. In each use group and for virtually all of the claim size categories, the two-door models had higher claim frequency results than the four-door models.

Table 12 and Figures 9 through 11 show the collision coverage loss experience results by vehicle use and body style. Vehicles insured for business or work use had slightly higher results, with the exception of average payments per claim for two-door models, than vehicles insured for pleasure or farm use. For each measure of collision coverage loss experience – claim frequency, average payment per claim, and average loss payment per insured vehicle year – two-door models had worse results than four-door models.

These body style differences were also consistent for the four two-door and four-door models whose individual loss experience is summarized in Appendices A4 and A5. Nearly every measure of injury and collision loss experience was higher for the two-door models than for their four-door counterparts.

As with the earlier results by operator age group and vehicle density, the results by vehicle use category show that vehicle use differences are not contributing to the differences in loss experience for two- and four-door models.

Operator Age Group, Vehicle Density, and Vehicle Use

The previous sections have shown that two-door models consistently had higher collision loss results than four-door models in nearly every driver class, vehicle density, and vehicle use group. Body style differences in injury loss experience, however, were not as pronounced. Although two-door models tended to have higher overall injury loss results as well as higher results for claims in excess of $250 than four-door models, these differences were not consistent for the larger claim size categories.

Differences in loss experience by body style were also apparent when the effects of driver age, vehicle density, and vehicle use were examined in combination. Table 13 summarizes the overall injury loss experience by operator age group, vehicle density, and vehicle use by body style. Results are presented only for operator age group 25-64, since the other operator age groups had insufficient exposure to meet the reporting threshold of 5,000 insured vehicle years. Two-door models had higher loss results than four-door models for nearly every claim size. Only among those drivers aged 25-64, whose vehicles were garaged in areas of greater than 600 vehicles per square mile and were insured primarily for work or business use, did four-door models have higher injury loss results.

(cont'd on page 28)

Table 9
Personal Injury Protection Coverages
Mix of Exposure by Vehicle Use and Body Style
1978-1979 Models

Vehicle Use	Body Style	Exposure (Insured Vehicle Years)	Percentage of Exposure
Farm or Pleasure Use	2 Dr.	101,660	49
	4 Dr.	113,660	56
Work or Business Use	2 Dr.	104,264	51
	4 Dr.	90,794	44
Total	2 Dr.	205,924	100
	4 Dr.	204,454	100

NOTES:

- Results are based on the loss experience of the following 1978-1979 two- and four-door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

Table 10
Collision Coverages
Mix of Exposure by Vehicle Use and Body Style
1978-1980 Models

Vehicle Use	Body Style	Exposure (Insured Vehicle Years)	Percentage of Exposure
Farm or Pleasure Use	2 Dr.	269,779	51
	4 Dr.	291,899	56
Work or Business Use	2 Dr.	263,597	49
	4 Dr.	228,777	44
Total	2 Dr.	533,376	100
	4 Dr.	520,676	100

NOTES:

- Results are based on the loss experience of the following 1978-1980 two- and four- door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

Table 11
Personal Injury Protection Injury Coverages
Claim Frequency Results by Vehicle Use and Body Style
1978-1979 Models

Vehicle Use	Body Style	Claim Frequency by Size of Claim (per 1000 Insured Vehicle Years)			
		All	> $250	> $500	> $1000
Farm or Pleasure Use	2 Dr.	20.2	8.1	4.9	3.1
	4 Dr.	17.6	6.9	4.5	2.7
Work or Business Use	2 Dr.	21.1	8.3	5.2	3.0
	4 Dr.	19.8	8.0	5.2	3.1

NOTES:

- Minimum exposure thresholds for reporting:

All claims	5,000 vehicle years
Claims >$250	10,000 vehicle years
Claims >$500	15,000 vehicle years
Claims >$1000	25,000 vehicle years

- Results are based on the loss experience of the following 1978-1979 two- and four-door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.

- All results are standardized, see Appendix C for details.

Figure 8
Personal Injury Protection Coverages
Claim Frequency Results by Vehicle Use and Body Style
1978-1979 Models

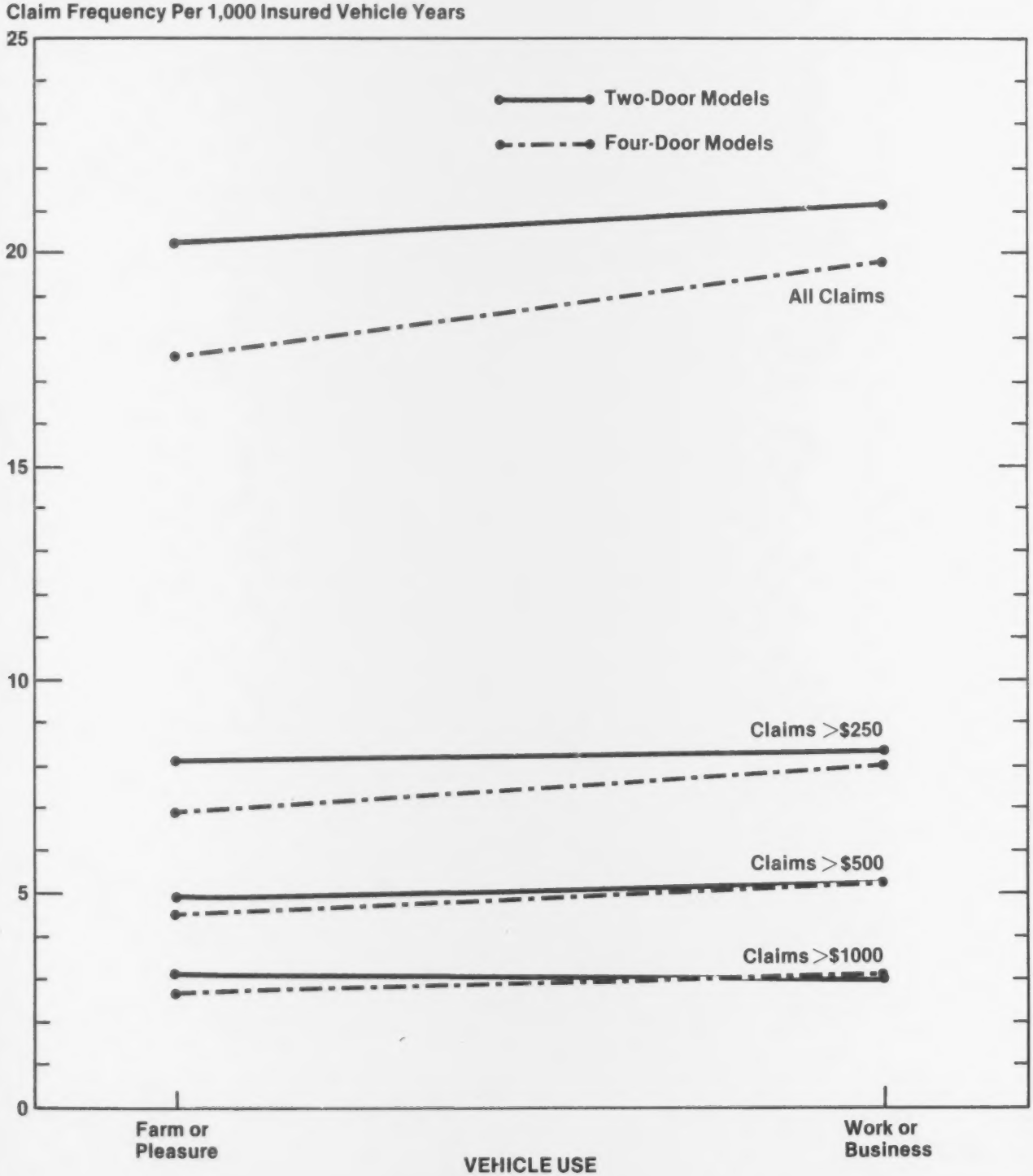


Table 12
Collision Coverages
Loss Results by Vehicle Use and Body Style
1978-1980 Models

Vehicle Use	Body Style	Claim Frequency Per 100 Insured Vehicle Years	Average Loss Payment Per Claim	Average Loss Payment Per Insured Vehicle Year
Farm or Pleasure Use	2 Dr.	9.6	$1017	$ 99
	4 Dr.	8.6	951	83
Work or Business Use	2 Dr.	9.7	1016	101
	4 Dr.	8.9	970	88

NOTES:

- Results are based on the loss experience of the following 1978-1980 two- and four-door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.
- All results are standardized; see Appendix C for details.

Figure 9
Collision Coverages
Claim Frequency Results by Vehicle Use and Body Style
1978-1980 Models

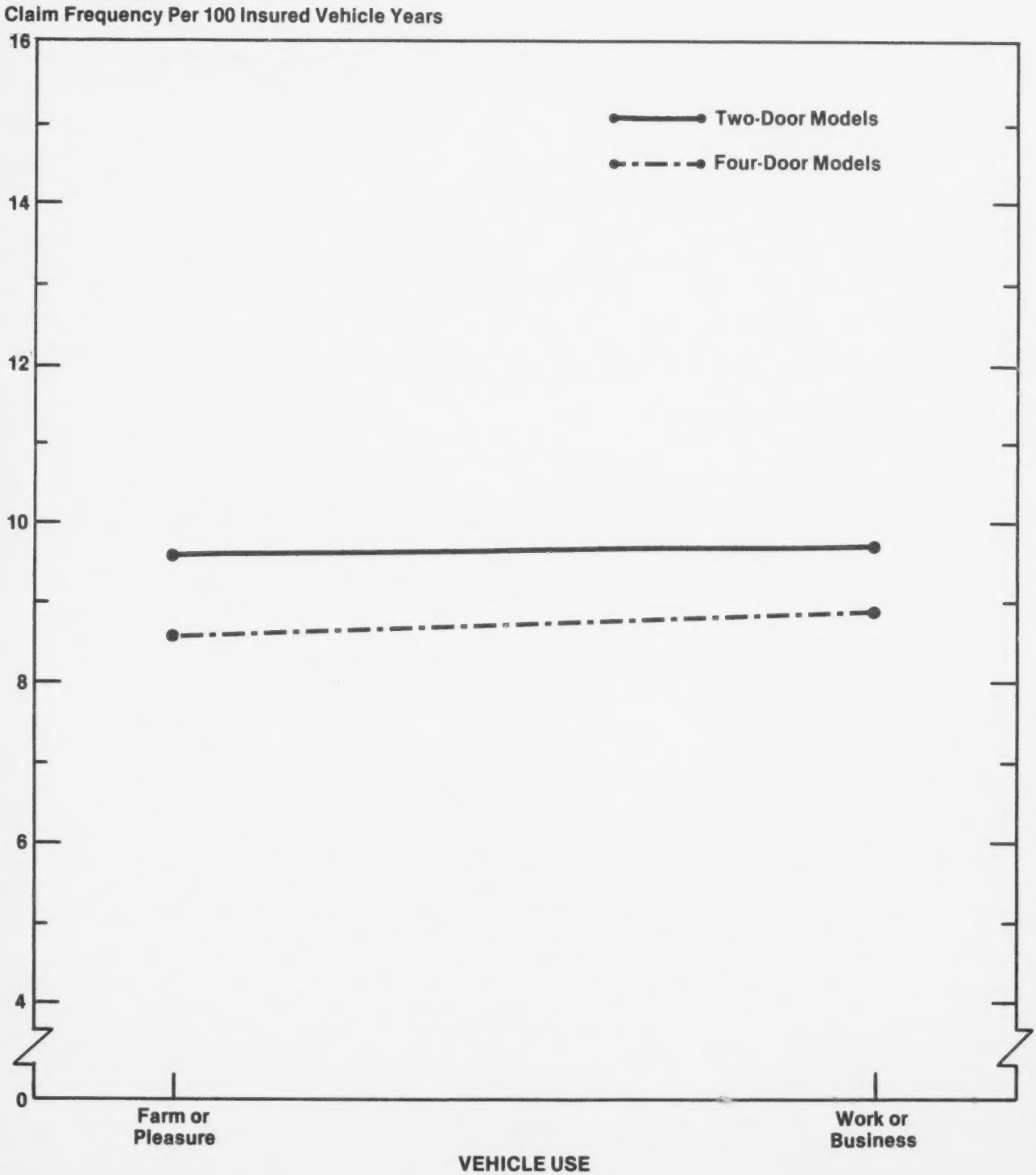


Figure 10
Collision Coverages
Average Loss Payment Per Claim by Vehicle Use and Body Style
1978-1980 Models

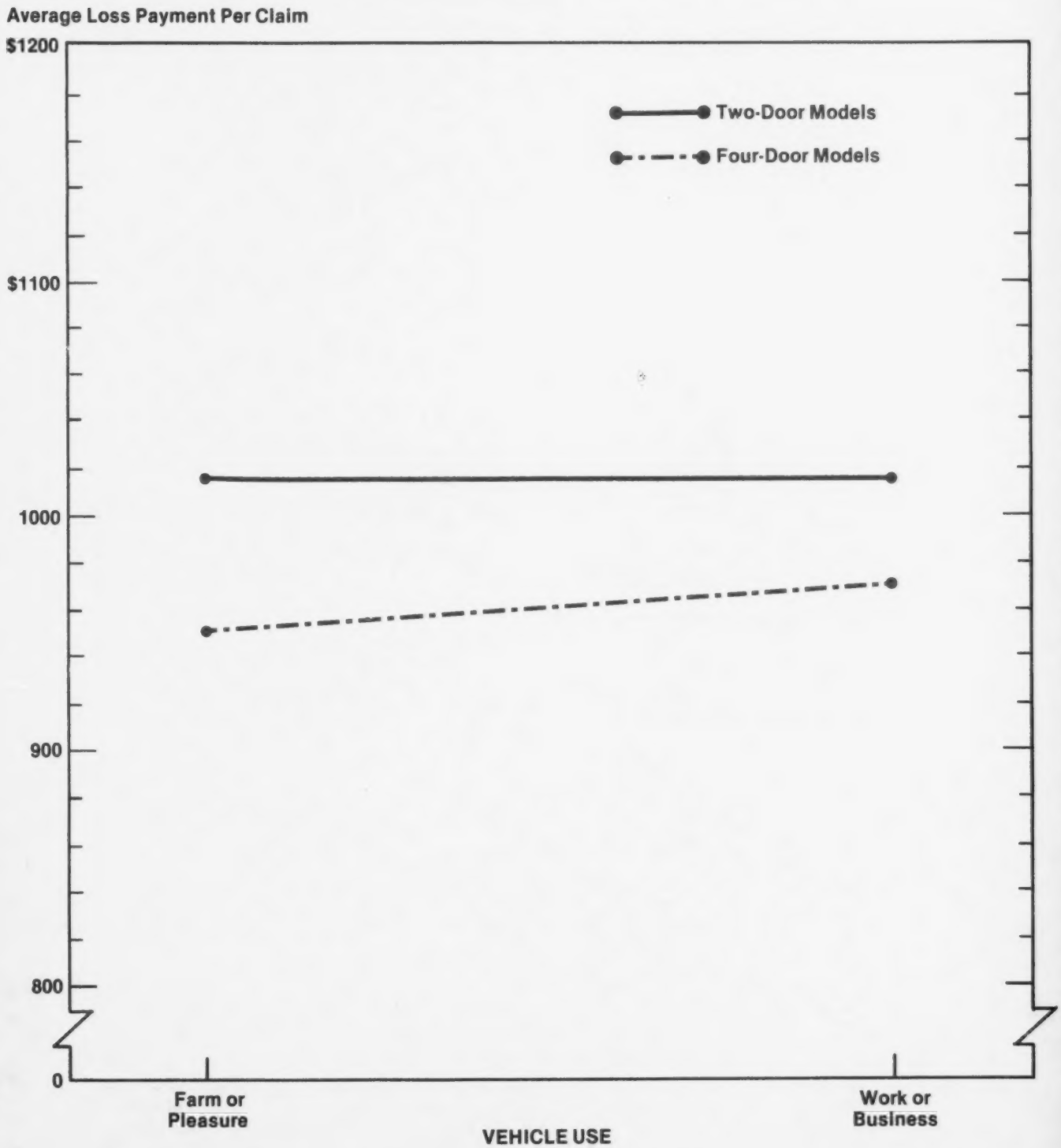


Figure 11
Collision Coverages
Average Loss Payment Per Insured Vehicle Year by Vehicle Use and Body Style
1978-1980 Models

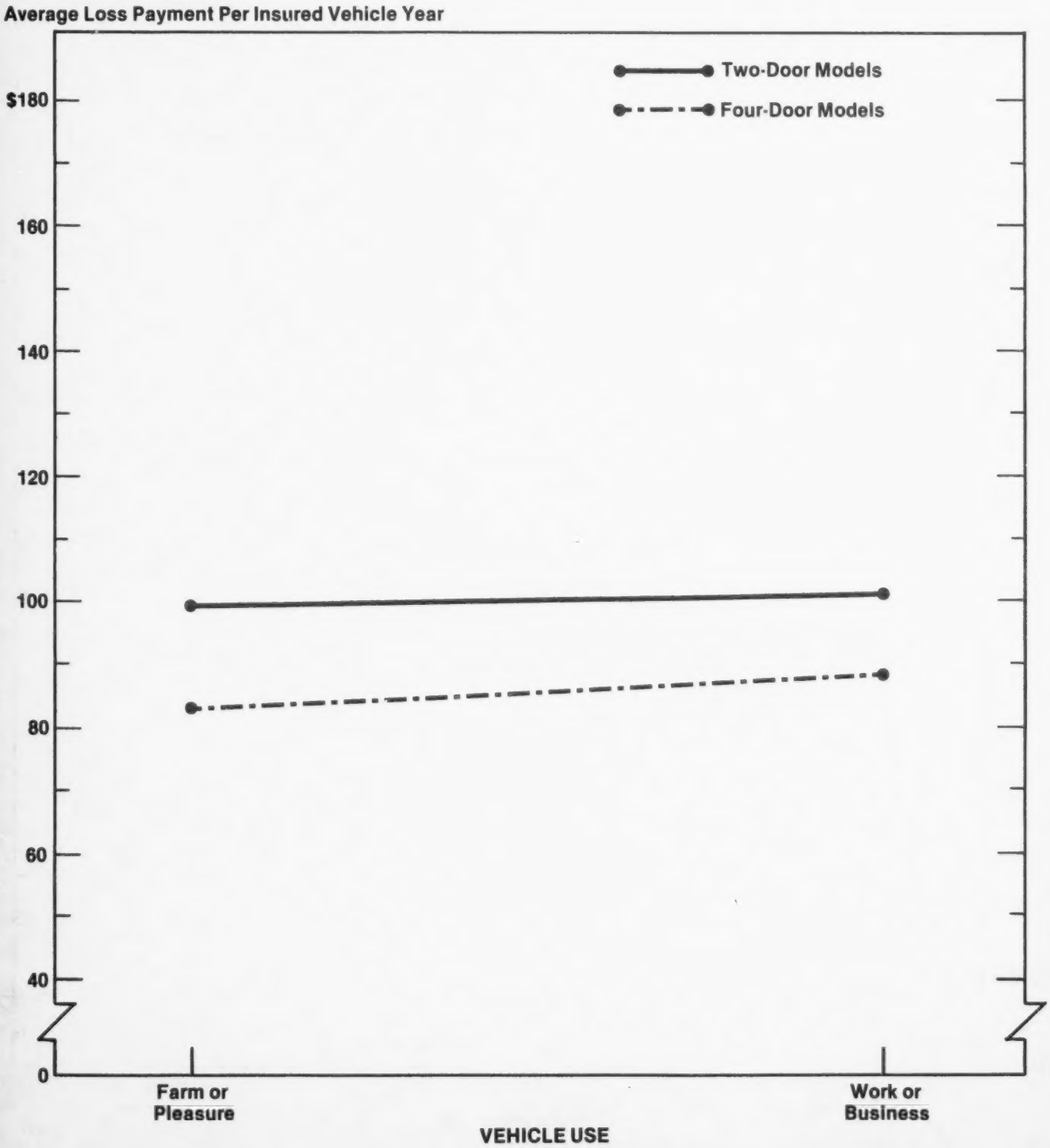


Table 13
Personal Injury Protection Coverages
Claim Frequency Results by Operator Age Group, Vehicle Density, Vehicle Use, and Body Style
1978-1979 Models

	Operator Age Group	Vehicle Density	Vehicle Use	Claim Frequency by Size of Claim (Per 1,000 Insured Vehicle Years)							
				All		>$250		>$500		>$1,000	
				2 Dr.	4 Dr.	2 Dr.	4 Dr.	2 Dr.	4 Dr.	2 Dr.	4 Dr.
Youthful Operator	17-20										
	21-24										
	All Other Youthful										
No Youthful Operator	25-64	0-50	Farm	18.0	15.2	6.8	6.2	3.9	3.8		
		51-600	or	17.2	15.5	7.0	6.1	4.0	4.0	2.6	2.6
		>600	Pleasure	21.6	17.5	9.1	6.8	6.3	4.0		
		0-50	Work	18.4	16.2	7.8	6.5	4.6	4.1		
		51-600	or	18.7	17.6	7.6	6.6	4.7	4.4	2.7	2.7
		>600	Business	20.1	20.7	8.1	8.8	5.1	5.8		
	≥65										

NOTES:

- Minimum exposure thresholds for reporting:

All claims	5,000 vehicle years
Claims >$250	10,000 vehicle years
Claims >$500	15,000 vehicle years
Claims >$1,000	25,000 vehicle years

- Results are based on the loss experience of the following 1978-1979 two- and four-door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.
- All results are standardized; see Appendix C for details.

Table 14 shows the collision loss experience results when the effects of the three non-vehicle factors were combined. In virtually every case, two-door models had higher claim frequencies and average loss payments per insured vehicle year than four-door models. No consistent pattern was apparent for the average payments per claim.

Table 15 presents injury loss results by vehicle density and vehicle use standardized by age groups. With the exception of vehicles garaged in areas of more than 600 registered vehicles per square mile that were insured primarily for work or business uses, two-door models had higher injury loss results than four-door models for each vehicle density and vehicle use group.

Table 16 illustrates similar results for collision coverages. In this case body style differences in collision coverage results were even more pronounced when the effects of operator age group were removed. In each instance, for every measure of collision coverage experience, two-door models had worse loss results than four-door models.

Table 14
Collision Coverages
Loss Results by Operator Age Group, Vehicle Density, Vehicle Use, and Body Style
1978-1980 Models

	Operator Age Group	Vehicle Density	Vehicle Use	Claim Frequency Per 100 Insured Vehicle Years		Average Loss Payment Per Claim		Average Loss Payment Per Insured Vehicle Year	
				2 Dr.	4 Dr.	2 Dr.	4 Dr.	2 Dr.	4 Dr.
Youthful Operator	17-20	0-50	Farm	16.1	12.6	$1205	$1187	$194	$150
		51-600	or	15.8	12.7	1105	1117	175	142
		>600	Pleasure	17.0	14.4	1134	1039	193	150
		0-50	Work	16.3	14.1	1276	1093	208	154
		51-600	or	16.2	14.0	1113	1068	180	150
		>600	Business	17.6	15.0	1115	1022	196	153
	21-24	0-50	Farm	12.3	11.6	1100	1112	135	129
		51-600	or	12.3	10.4	1061	962	131	100
		>600	Pleasure	13.7	12.7	979	1090	134	138
		0-50	Work	10.4	9.7	1105	1141	115	111
		51-600	or	11.6	10.8	1058	1100	123	119
		>600	Business	13.6	12.1	996	1057	135	128
	All Other Youthful	0-50	Farm	12.3	10.5	1260	1143	155	120
		51-600	or						
		>600	Pleasure						
		0-50	Work						
		51-600	or						
		>600	Business						
No Youthful Operator	25-64	0-50	Farm	7.7	6.9	1036	931	80	64
		51-600	or	7.9	7.2	979	931	77	67
		>600	Pleasure	9.8	9.0	962	874	94	79
		0-50	Work	7.7	7.0	1057	977	81	68
		51-600	or	8.3	7.8	990	937	82	73
		>600	Business	9.7	9.5	934	898	91	85
	≥65	0-50	Farm	6.4	6.5	864	790	55	51
		51-600	or	7.5	6.2	868	957	65	59
		>600	Pleasure	7.9	7.8	1047	790	83	62
		0-50	Work						
		51-600	or	8.7	6.4	1046	933	91	60
		>600	Business	11.9	10.1	862	853	103	86

NOTES:

- Results based on less than 1,000 insured vehicle years are not reported.
- Results are based on the loss experience of the following 1978-1980 two- and four-door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.
- All results are standardized; see Appendix C for details.

Table 15
Personal Injury Protection Coverages
Claim Frequency Results by Vehicle Density, Vehicle Use, and Body Style
1978-1979 Models

Vehicle Density	Vehicle Use	Claim Frequency by Size of Claim (Per 1,000 Insured Vehicle Years)							
		All		>$250		>$500		>$1,000	
		2 Dr.	4 Dr.	2 Dr.	4 Dr.	2 Dr.	4 Dr.	2 Dr.	4 Dr.
0-50	Farm	19.1	16.3	7.4	6.4	4.3	4.2	2.7	2.9
51-600	or	19.4	17.5	7.7	6.8	4.5	4.1	2.8	2.3
>600	Pleasure	22.8	19.1	9.3	7.7	6.3	5.1	3.9	2.8
0-50	Work	20.5	17.6	8.3	6.8	5.3	4.0	3.2	2.4
51-600	or	20.3	19.7	7.8	7.4	4.7	5.1	2.6	3.7
>600	Business	22.5	22.6	9.5	9.8	5.9	6.3	3.4	3.7

NOTES:

- Minimum exposure thresholds for reporting:

All claims	5,000 vehicle years
Claims >$250	10,000 vehicle years
Claims >$500	15,000 vehicle years
Claims >$1000	25,000 vehicle years

- Results are based on the loss experience of the following 1978-1979 two-and four-door models: Plymouth Horizon (1979 model year only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.
- All results are standardized; see Appendix C for details.

Table 16
Collision Coverages
Loss Results by Vehicle Density, Vehicle Use, and Body Style
1978-1980 Models

Vehicle Density	Vehicle Use	Claim Frequency Per 100 Insured Vehicle Years		Average Loss Payment Per Claim		Average Loss Payment Per Insured Vehicle Year	
		2 Dr.	4 Dr.	2 Dr.	4 Dr.	2 Dr.	4 Dr.
0-50	Farm	9.1	8.0	$1062	$ 977	$ 97	$ 78
51-600	or	9.2	8.1	1003	964	93	78
>600	Pleasure	10.9	10.0	986	910	107	91
0-50	Work	8.9	8.0	1079	1017	96	81
51-600	or	9.5	8.8	1013	967	96	85
>600	Business	11.0	10.3	961	931	106	96

NOTES:

- Results are based on the loss experience of the following 1978-1980 two- and four-door models: Plymouth Horizon (1979-1980 model years only), Chevrolet Chevette, Chevrolet Malibu, and Ford Fairmont.
- All results are standardized; see Appendix C for details.

Appendix A

Loss Results by Make and Series

Appendix A1
Collision Coverages
Detailed Loss Results by Operator Age Group
1978-1980 Models

	Operator Age Group	Model	Body Style	Exposure (Insured Vehicle Years)	Claim Frequency Per 100 Insured Vehicle Years	Average Loss Payment Per Claim	Average Loss Payment Per Insured Vehicle Year
Youthful Operator	17-20	Plym. Horizon	2 Dr.	2,812	19.8	$1458	$288
		Plym. Horizon	4 Dr.	3,256	13.4	1328	178
		Ford Fairmont	2 Dr.	14,006	16.5	1173	194
		Ford Fairmont	4 Dr.	5,993	12.8	1055	135
		Chev. Chevette	2 Dr.	21,516	16.1	1120	180
		Chev. Chevette	4 Dr.	19,546	14.6	1110	162
		Chev. Malibu	2 Dr.	7,467	15.5	1114	173
		Chev. Malibu	4 Dr.	6,050	13.0	1046	136
	21-24	Plym. Horizon	2 Dr.	2,847	14.1	1375	194
		Plym. Horizon	4 Dr.	3,832	11.5	1171	134
		Ford Fairmont	2 Dr.	14,093	12.5	1074	134
		Ford Fairmont	4 Dr.	3,626	11.4	1101	125
		Chev. Chevette	2 Dr.	21,773	11.8	1008	119
		Chev. Chevette	4 Dr.	14,945	11.2	1063	119
		Chev. Malibu	2 Dr.	9,442	11.5	1001	115
		Chev. Malibu	4 Dr.	3,271	10.2	1037	106
	All Other Youthful	Plym. Horizon	2 Dr.				
		Plym. Horizon	4 Dr.				
		Ford Fairmont	2 Dr.				
		Ford Fairmont	4 Dr.				
		Chev. Chevette	2 Dr.	3,136	10.9	1065	116
		Chev. Chevette	4 Dr.	2,299	10.8	1068	115
		Chev. Malibu	2 Dr.				
		Chev. Malibu	4 Dr.				

(Appendix A1 continued on next page)

Appendix A1 (continued)
Collision Coverages
Detailed Loss Results by Operator Age Group
1978-1980 Models

	Operator Age Group	Model	Body Style	Exposure (Insured Vehicle Years)	Claim Frequency Per 100 Insured Vehicle Years	Average Loss Payment Per Claim	Average Loss Payment Per Insured Vehicle Year
No Youthful Operator	25-64	Plym. Horizon	2 Dr.	22,005	10.2	$1180	$120
		Plym. Horizon	4 Dr.	42,294	7.5	1028	77
		Ford Fairmont	2 Dr.	151,551	8.6	990	85
		Ford Fairmont	4 Dr.	91,147	8.1	934	75
		Chev. Chevette	2 Dr.	126,687	8.1	997	80
		Chev. Chevette	4 Dr.	181,748	7.5	926	69
		Chev. Malibu	2 Dr.	104,188	8.2	926	76
		Chev. Malibu	4 Dr.	101,224	7.9	877	70
	≥65	Plym. Horizon	2 Dr.				
		Plym. Horizon	4 Dr.				
		Ford Fairmont	2 Dr.	11,070	7.9	922	73
		Ford Fairmont	4 Dr.	13,365	7.3	913	67
		Chev. Chevette	2 Dr.	3,688	6.6	903	60
		Chev. Chevette	4 Dr.	7,283	6.3	833	53
		Chev. Malibu	2 Dr.	9,117	7.6	833	64
		Chev. Malibu	4 Dr.	17,594	7.3	856	62

NOTES:

- Results based on less than 1,000 insured vehicle years are not reported.
- All results are standardized; see Appendix C for details.

Appendix A2
Personal Injury Protection Coverages
Detailed Claim Frequency Results by Vehicle Density
1978-1979 Models

Vehicle Density	Model	Body Style	Exposure (Insured Vehicle Years)	Claim Frequency by Size of Claim (Per 1,000 Insured Vehicle Years)			
				All	>$250	>$500	>$1,000
0-50 Vehicles per Square Mile	Plym. Horizon	2 Dr.					
	Plym. Horizon	4 Dr.					
	Ford Fairmont	2 Dr.	23,825	19.9	8.3	5.3	
	Ford Fairmont	4 Dr.	15,636	18.6	7.8	5.0	
	Chev. Chevette	2 Dr.	19,049	21.2	8.2	4.3	
	Chev. Chevette	4 Dr.	27,925	17.8	7.0	4.4	
	Chev. Malibu	2 Dr.	14,665	15.0	5.7		
	Chev. Malibu	4 Dr.	15,173	13.8	4.9		
51-600 Vehicles per Square Mile	Plym. Horizon	2 Dr.	5,066	19.2			
	Plym. Horizon	4 Dr.	9,424	15.4			
	Ford Fairmont	2 Dr.	30,590	21.6	8.4	5.1	
	Ford Fairmont	4 Dr.	17,297	18.4	8.4	5.0	
	Chev. Chevette	2 Dr.	28,821	20.4	8.2	4.9	2.9
	Chev. Chevette	4 Dr.	35,817	20.9	7.5	5.0	3.0
	Chev. Malibu	2 Dr.	20,585	17.3	6.8	4.0	
	Chev. Malibu	4 Dr.	20,495	16.7	6.1	4.2	
>600 Vehicles per Square Mile	Plym. Horizon	2 Dr.					
	Plym. Horizon	4 Dr.					
	Ford Fairmont	2 Dr.	20,731	23.5	10.2		
	Ford Fairmont	4 Dr.	12,180	21.5	9.3		
	Chev. Chevette	2 Dr.	18,000	22.9	10.4	6.7	
	Chev. Chevette	4 Dr.	21,417	23.7	9.1	5.7	
	Chev. Malibu	2 Dr.	18,772	21.6	7.6	4.7	
	Chev. Malibu	4 Dr.	17,953	15.3	6.8	4.3	

NOTES:

- Minimum exposure thresholds for reporting:

All claims	5,000 vehicle years	Claims >$500	15,000 vehicle years
Claims >$250	10,000 vehicle years	Claims >$1,000	25,000 vehicle years

- All results are standardized; see Appendix C for details.

Appendix A3
Collision Coverages
Detailed Loss Results by Vehicle Density
1978-1980 Models

Vehicle Density	Model	Body Style	Exposure (Insured Vehicle Years)	Claim Frequency per 100 Insured Vehicle Years	Average Loss Payment Per Claim	Average Loss Payment Per Insured Vehicle Year
0-50 Vehicles per Square Mile	Plym. Horizon	2 Dr.	9,511	11.1	$1355	$154
	Plym. Horizon	4 Dr.	16,312	8.0	1075	88
	Ford Fairmont	2 Dr.	70,151	9.2	1070	100
	Ford Fairmont	4 Dr.	44,625	8.2	1008	84
	Chev. Chevette	2 Dr.	58,674	8.6	1065	92
	Chev. Chevette	4 Dr.	83,299	7.9	994	80
	Chev. Malibu	2 Dr.	41,772	8.4	989	85
	Chev. Malibu	4 Dr.	42,971	7.7	942	74
51-600 Vehicles per Square Mile	Plym. Horizon	2 Dr.	12,770	11.8	1207	145
	Plym. Horizon	4 Dr.	21,042	8.1	1135	94
	Ford Fairmont	2 Dr.	71,843	9.6	1010	98
	Ford Fairmont	4 Dr.	40,434	8.7	966	85
	Chev. Chevette	2 Dr.	70,863	8.8	993	88
	Chev. Chevette	4 Dr.	87,513	8.3	962	81
	Chev. Malibu	2 Dr.	49,258	8.9	964	87
	Chev. Malibu	4 Dr.	46,624	8.5	927	79
>600 Vehicles per Square Mile	Plym. Horizon	2 Dr.	7,615	11.8	1126	136
	Plym. Horizon	4 Dr.	13,329	9.8	1043	104
	Ford Fairmont	2 Dr.	51,865	11.2	969	110
	Ford Fairmont	4 Dr.	30,044	10.2	932	96
	Chev. Chevette	2 Dr.	47,262	10.7	979	106
	Chev. Chevette	4 Dr.	55,008	10.1	918	94
	Chev. Malibu	2 Dr.	41,792	10.7	920	99
	Chev. Malibu	4 Dr.	39,475	10.1	863	88

NOTES:

- All results are standardized; see Appendix C for details.

Appendix A4
Personal Injury Protection Coverages
Detailed Claim Frequency by Vehicle Use
1978-1979 Models

Vehicle Use	Model	Body Style	Exposure (Insured Vehicle Years)	Claim Frequency by Size of Claim (Per 1,000 Insured Vehicle Years)			
				All	>$250	>$500	>$1,000
Farm or Pleasure	Plym. Horizon	2 Dr.					
	Plym. Horizon	4 Dr.					
	Ford Fairmont	2 Dr.	38,268	20.8	8.7	5.6	3.3
	Ford Fairmont	4 Dr.	26,701	18.3	8.0	5.3	2.9
	Chev. Chevette	2 Dr.	29,740	21.0	8.5	4.8	3.0
	Chev. Chevette	4 Dr.	43,275	19.1	7.0	4.5	2.8
	Chev. Malibu	2 Dr.	28,720	17.5	6.7	4.5	2.9
	Chev. Malibu	4 Dr.	33,329	14.5	5.3	3.3	2.4
Work or Business	Plym. Horizon	2 Dr.	6,154	20.4			
	Plym. Horizon	4 Dr.	10,206	17.2			
	Ford Fairmont	2 Dr.	36,878	22.6	9.1	5.8	
	Ford Fairmont	4 Dr.	18,412	21.2	9.2	5.8	
	Chev. Chevette	2 Dr.	36,130	21.5	8.8	5.4	3.0
	Chev. Chevette	4 Dr.	41,884	22.0	8.4	5.4	3.2
	Chev. Malibu	2 Dr.	25,102	18.9	6.9	4.0	
	Chev. Malibu	4 Dr.	20,292	15.9	6.8	4.4	

NOTES:

- Minimum exposure thresholds for reporting:

All claims	5,000 vehicle years
Claims >$250	10,000 vehicle years
Claims >$500	15,000 vehicle years
Claims >$1,000	25,000 vehicle years

- All results are standardized; see Appendix C for details.

Appendix A5
Collision Coverages
Detailed Loss Results by Vehicle Use
1978-1980 Models

Vehicle Use	Model	Body Style	Exposure (Insured Vehicle Years)	Claim Frequency per 100 Insured Vehicle Years	Average Loss Payment Per Claim	Average Loss Payment Per Insured Vehicle Year
Farm or Pleasure	Plym. Horizon	2 Dr.	13,742	11.9	$1303	$159
	Plym. Horizon	4 Dr.	25,842	8.3	1083	92
	Ford Fairmont	2 Dr.	101,403	9.6	1000	98
	Ford Fairmont	4 Dr.	68,858	8.7	961	85
	Chev. Chevette	2 Dr.	82,512	9.4	1010	95
	Chev. Chevette	4 Dr.	117,063	8.5	954	83
	Chev. Malibu	2 Dr.	72,121	9.1	960	89
	Chev. Malibu	4 Dr.	80,136	8.5	895	77
Work or Business	Plym. Horizon	2 Dr.	16,153	11.5	1162	135
	Plym. Horizon	4 Dr.	24,841	8.7	1093	97
	Ford Fairmont	2 Dr.	92,457	10.2	1038	107
	Ford Fairmont	4 Dr.	46,245	9.4	979	95
	Chev. Chevette	2 Dr.	94,286	9.2	1007	93
	Chev. Chevette	4 Dr.	108,757	8.6	971	85
	Chev. Malibu	2 Dr.	60,701	9.5	958	93
	Chev. Malibu	4 Dr.	48,934	9.1	919	84

NOTES:

- All results are standardized; see Appendix C for details.

Appendix B

Sources and Nature of Data

Sources and Nature of Data

Policy and claim related coverage data for 1978 model year vehicles in the calendar period September 1977 through September 1980, for 1979 model year vehicles in the period September 1978 through September 1980, and for 1980 model year vehicles in the period September 1979 through September 1980 were used in the preparation of this report. "Assigned risk", fleet policies, and all data from Massachusetts were excluded.

The personal injury protection coverages reported in this study were based on data from the 20 states listed in Table B-1.

Table B-1
Personal Injury Protection (PIP) Coverages
States Included

Colorado	Minnesota
Connecticut	Nevada (through December 1979)
Delaware	New Jersey
Florida	New York
Georgia	North Dakota
Hawaii	Oregon
Kansas	Pennsylvania
Kentucky	South Carolina
Maryland	Texas
Michigan	Utah

The calendar periods reflected in the data used from each company are summarized below:

COMPANY	CALENDAR PERIOD
Aetna	September 1977-September 1980
Allstate	September 1977-September 1980
GEICO	September 1978-August 1980
Kemper	September 1977-September 1980
Liberty	September 1977-July 1980
Nationwide	September 1977-September 1980
Prudential	September 1977-August 1980
State Farm	September 1977-Septeember 1980
Travelers	September 1977-September 1980
USAA	September 1978-September 1980

The number of registered passenger vehicles per square mile was obtained from data on the number of registered passenger vehicles in specific geographic areas obtained from the R.L. Polk Company and the corresponding land areas obtained from the Rand McNally Company.

Insurance Policy Data

Insurance policy data, as distinct from claim data, describe the characteristics of an insured vehicle, including its make and series and the nature of its coverage. Policy data used in this report included the

following basic information:

Vehicle Identification Number (VIN)*
Deductible Amount*
Vehicle Use
Rated Driver Characteristics*
Recorded Garaging Location
Date and Nature of Relevant Changes in Coverages

Insurance Claim Data

Insurance claim data report the characteristics of an insured vehicle for which a claim is made, the initiation of the claim, and/or the corresponding payment. Claim data used in this report included the following basic information:

Vehicle Identification Number (VIN)
Crash Date
Loss Payment Amount

The dollar amounts reported represented collision coverage loss payments made to or on behalf of the policyholder for damage to the insured vehicle.

*See Appendix D for definitions.

Appendix C

Method of Data Analysis

Method of Data Analysis

Insurance Coverages

Results in this report are based on "personal injury protection" (PIP) and collision coverages. PIP coverages are provided in so-called no-fault states. These coverages were selected because they provide medical expense reimbursement to injured occupants of the insured vehicle.

Use of PIP insurance data to identify crashes involving injury has certain limitations because these data cannot provide information on all occupant injuries. This occurs when claims for injury costs are not made under PIP coverages because of the availability of other sources of medical expense reimbursements such as bodily injury liability and/or health insurance coverages. Consequently, PIP claim frequencies do not include all of the crashes involving injury. This limitation should not distort comparisons among different vehicles.

Vehicle Description and Identification

The Vehicle Identification Numbers (VINs) of most new automobiles sold in the United States are individually unique numbers that contain, in coded form, detailed information as to each vehicle's make, model year, series, and other distinguishing characteristics.

The very specific vehicle types for which results are presented in this report were derived from the VINs of the individual automobiles.

Only data with valid VINs were used for this report. Each VIN was decoded into a set of specific characteristics. For the purposes of this report the vehicle characteristics of primary concern were make, model year, series, and body style.

Driver Characteristics

Five age, sex, and marital status classifications are used in this study. The five classes are:

1) All drivers aged 65 or older
2) Drivers aged 25-64 except single males 25-29
3) Drivers aged 17-20 except married females
4) Drivers aged 21-24 except married females
5) Married female drivers aged 17-24 and single male drivers aged 25-29

These classes are derived from insurance policy data giving the demographic characteristics of the rated driver for each vehicle.

Vehicle Density

For the purposes of this report, vehicle density was defined as the number of passenger vehicles, registered in 1974, per square mile for any given garaging location. The garaging locations were defined in one of two ways, depending on the source. One definition was a zip zone – defined as the aggregation of those zip codes with identical first three digits. The areas encompassed by such aggregations of zip codes are always contiguous. The other definition of a garaging location corresponded to insurance state and territory rating territories.

The data for the computation of zip zone densities were derived from zip zone land areas in square miles and the number of registered passenger cars for each zip zone. From these two data sources a computerized table was created permitting the computation of vehicle densities for each zip zone. For example, Manhattan, New York is zip zone 100 with individual zip codes within Manhattan ranging from 10001 through 10045. In 1974 there were 123,826 passenger cars registered in this zip zone, which had a land area of 23 square miles; thus, the resultant density was 5,384 vehicles per square mile. For the companies supplying garaging location information in zip code form, the appropriate vehicle density was assigned to each insured vehicle from this table.

For the companies supplying garaging locations in the form of insurance state and territory codes, a second separate table was constructed, listing each state and territory code and, for each, all of the zip zones either completely or partially within that territory. For example, state 31, territory 18, is Manhattan, New York and the only zip zone that is within that territory, either completely or partially, is zip zone 100. Therefore, the same vehicle density result obtained above was also obtained for this insurance territory. Some insurance territories, however, contain all or part of more than one zip zone. For example, state 31, territory 8, is semi-suburban Buffalo, New York, and zip zone 141 and 142 are within that territory. For such insurance territories, the vehicle density was derived by summing all of the registered vehicles and all of the land areas for the zip zones that were partially or completely within the territory.

Through knowledge of their listed garaging locations and use of the area and registration data described above, the distributions of insured vehicles in the HLDI files by vehicle density were obtained for 1978 through 1980 vehicles. From these distributions, three vehicle density groups were defined, each containing nearly one-third of the total number of insured vehicles.

The three vehicle density groups and examples of zip zones and insurance state and territory descriptions for each are presented in Table C-1.

Table C-1
Examples of Garaging Locations and Associated Vehicle Densities

Vehicle Density Group	—Zip Zones— Zip	Description	Insurance State and Territory Descriptions
0-50 Registered Vehicles per Square Mile	035	Littleton, NH	Warren County, MS
	504	Mason City, IA	Decatur, IL
	338	Lakeland, FL	Bloomington, IN
51-600 Registered Vehicles per Square Mile	173	York, PA	Harris County, TX
	253	Charleston, WV	New Britain, CT
	787	Austin, TX	Bridgeport, CT
>600 Registered Vehicles per Square Mile	551	St. Paul, MN	Syracuse, NY
	086	Trenton, NJ	Norfolk, VA
	112	Brooklyn, NY	Philadelphia, PA

Vehicle Use

Two vehicle use classifications were derived from the insurance coverage data. Vehicles were classified as to whether they were operated primarily for farm or pleasure use or for work or business use.

Exposure

Exposure, in terms of insured vehicle years, was computed for each individual vehicle from the coverage data. For each model, exposure was computed for each of the thirty combinations of driver class, vehicle density, and vehicle use group.

Claim Frequency

Both pending and paid claims for an individual vehicle were first matched with its corresponding coverage data to ensure that the crash had occurred within an appropriate period of injury or collision coverage for that vehicle. In every instance in which multiple claims were made for the same crash – e.g., when more than one occupant of the car incurred medical expenses – the claims were treated as a single injury claim in the calculation of claim frequencies. It should be noted that medical expenses can sometimes be incurred even though the occupants are not injured. This can occur, for example, when precautionary medical examinations are undertaken even though no injuries are apparent, or, in fact, found.

Claims that were settled without payment, as well as those paid for collision losses even though the damage was less than the deductible amount, were excluded from the computations. All remaining claims for each vehicle series, together with the corresponding exposure, were used to compute the claim frequency. For injury coverages the claim frequency is the number of claims per 1,000 insured vehicle years; for collision coverages, it is the number of claims per 100 insured vehicle years.

In addition to the overall claim frequency results, separate claim frequency results were computed for claims in which the medical losses exceeded $250, $500, and $1,000. The latter three results provide indications of the extent to which particular cars are over- or under-involved in crashes resulting in more significant injuries. Claims involving non-medical losses only and claims settled without payments were not used. Thus, the claim frequencies represent the number of crashes per 1,000 insured vehicle years in which one or more injuries occurred resulting in medical expense claim payments under PIP insurance coverages.

For each vehicle series, claim frequencies were computed for each of the thirty possible combinations of driver class, vehicle density, and vehicle use group.

Average Loss Payment

Paid collision claims for each vehicle series were used to compute its average loss payment per claim. They were summed and divided by the number of claims to produce the average loss payment per claim. Claims that were settled without payment were excluded from the computations. In every instance in which multiple claims and/or multiple payments were made for the same crash, they were treated as a single claim and/or a single payment in the calculation of average loss payment.

Average loss payments were obtained for each combination of driver class, vehicle density, and vehicle use group.

Average Loss Payment Per Insured Vehicle Year

The average collision loss payment per insured vehicle year for each vehicle series was obtained by multiplying the claim frequency per 100 insured vehicle years by the average loss payment, and dividing the result by one hundred.

Average loss payments per insured vehicle year were also obtained for each combination of driver class, vehicle density, and vehicle use group.

Standardization

In order to remove any biases in the comparison of results by body style that could arise because of variations in the amount of exposure and related loss experience that each model contributes to the overall body style results, the results were adjusted or standardized to the same mix of model exposure. In this procedure, applied to both claim frequencies and average loss payments, a weighted combination of individual results was used to obtain the body style results. The weights used in the procedure are shown in the tables below.

Injury Coverage Vehicle Standardization Weights

Model	Exposure	% Total Exposure	Weight
Plymouth Horizon	31,647	7.72	.0772
Ford Fairmont	120,259	29.30	.2930
Chevrolet Chevette	151,029	36.80	.3680
Chevrolet Malibu	107,443	26.18	.2618
Total	410,378	100.00	1.0000

Collision Coverage Vehicle Standardization Weights

Model	Exposure	% Total Exposure	Weight
Plymouth Horizon	80,578	7.64	.0764
Ford Fairmont	308,963	29.31	.2931
Chevrolet Chevette	402,618	38.20	.3820
Chevrolet Malibu	261,892	24.85	.2485
Total	1,054,051	100.00	1.0000

As Tables 3 and 4 have shown above, loss experience also varied substantially in relation to operator age. Consequently, the loss results by body style for each vehicle density and vehicle use class were standardized to the same mix of operator age group as well as vehicle exposure. In this way, the results were based on the same mix, or distribution, of exposure for the five operator age groups. The weights used in the standardization procedure are shown in the following tables.

Injury Coverage Operator Age Group Weights

Operator Age Group	Weight
17-20	.0885
21-24	.1045
All other youthful	.0335
25-64	.7547
≥65	.0188
Total	1.0000

Collision Coverage Standardization Weights

Operator Age Group	Weight
17-20	.0892
21-24	.1060
All other youthful	.0308
25-64	.7564
≥65	.0176
Total	1.0000

Since the same weights were used in the calculation of results for each vehicle density and vehicle use class by body style, the effects due to operator age group were present in equal amounts in the standardized results.

This standardization procedure is widely used in vital health statistics*; the basic principle of this procedure is the introduction of a standard distribution of exposure for the different operator age groups.

* For example, see Armitage, P., *Statistical Methods in Medical Research,* Wiley, New York, 1971.

Appendix D

Definitions

Definitions

Average Loss Payment per Claim – The total of all collision loss payments made for the claims for a group of vehicles, divided by the number of claims paid; expressed as dollars per claim.

Average Loss Payment per Insured Vehicle Year – For a group of vehicles, the product of Claim Frequency and Average Loss Payment per Claim, divided by 100; expressed as dollars per insured vehicle year. It should be noted that this definition differs from the commonly used insurance term, pure premium, but yields similar results.

Collision Claim Frequency – The number of claims for a group of vehicles, divided by the exposure for that group; expressed as claims per one hundred insured vehicle years.

Collision Coverages – As defined in insurance contracts, the coverage under which people insure their own car against loss caused by collision.

Exposure – The time interval an individual vehicle is insured. Exposure for a group of vehicles is expressed in units of insured vehicle years.

First-Party Coverage – An insurance coverage under which the policyholder collects compensation for his losses from his own insurer regardless of fault.

Injury Claim Frequency – The number of claims for a group of vehicles, divided by the exposure for that group; expressed as claims per one thousand insured vehicle years.

Loss Payment – That portion of the collision damage cost borne by the insurer; in general, the total collision damage cost minus the deductible amount.

No-Fault Auto Insurance – An auto insurance plan in which each driver/owner accepts financial responsibility for some or all losses sustained by himself, pedestrains hit by him, and occupants of his own vehicle in return for which he enjoys some immunity from liability for losses to third-party persons.

Personal Injury Protection (PIP) Coverage – First-party no-fault coverage in which an insurer pays, within the specified limits, the medical, hospital, and other expenses of the insured, others in his vehicle, and pedestrians struck by him.

Rated Driver – The driver who, for insurance purposes, is considered to represent the greatest loss potential for the insured automobile.

Vehicle Identification Number (VIN) – A code, variously comprising both numbers and letters; normally 8 to 15 characters in length, assigned to each automobile by its manufacturer. The VIN uniquely identifies the vehicle within at least a ten-year time span, and, in recent model year vehicles, almost always contains coding which identifies the make, series, model year and other characteristics of each vehicle.

Vehicle Series – A name denoting a family of vehicles, within a make, with the same wheelbase and a degree of commonality in construction such as body, chassis, etc.

List of Publications

Other research reports published by the Highway Loss Data Institute are:

R72-1 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1972 Models,* June 1973.

R73-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1973 Models Compared with 1972 Models,* September 1973.

R73-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models,* March 1974.

R73-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Two Years,* December 1974.

R73-4 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1973 Models During Their First Three Years,* December 1975.

R74-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1974 Models,* May 1974.

R74-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Year,* December 1974.

R74-3 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1974 Models During Their First Two Years,* December 1975.

R75-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1975 Models,* July 1975.

R75-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1975 Models During Their First Year,* December 1975.

R76-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1976 Models,* June 1976.

R76-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1976 Models During Their First Year, 1975 Models During Their First Two Years, 1974 Models During Their First Three Years,* December 1976.

R77-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1977 Models,* June 1977.

R77-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1977 Models During Their First Year, 1976 Models During Their First Two Years, 1975 Models During Their First Three Years,* December 1977.

R78-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1978 Models,* June 1978.

R78-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1978 Models During Their First Year, 1977 Models During Their First Two Years, 1976 Models During Their First Three Years,* January 1979.

R79-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1979 Models,* June 1979.

R79-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1979 Models During Their First Year, 1978 Models During Their First Two Years, 1977 Models During Their First Three Years,* December 1979.

R80-1 *Automobile Insurance Losses, Collision Coverages; Initial Results for 1980 Models,* June 1980.

R80-2 *Automobile Insurance Losses, Collision Coverages; Variations by Make and Series, 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

V78-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles, 1978 Models During Their First Year, 1977 Models During Their First Two Years,* February 1979.

V79-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups and Utility Vehicles, 1979 Models During Their First Year, 1978 Models During Their First Two Years,* April 1980.

V79-2 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Vans, Pickup Trucks, and Utility Vehicles,* October 1980.

V79-3 *Insurance Theft Losses; Vans, Pickups, and Utility Vehicles, 1979 Models.* May 1981.

V80-1 *Automobile Insurance Losses, Non-Commercial Collision Coverages; Variations by Make and Series, Vans, Pickups, and Utility Vehicles, 1980 Models During Their First Year, 1979 Models During Their First Two Years, 1978 Models During Their First Three Years,* December 1980.

I 75-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974 and 1975 Models,* June 1976.

I 75-2 *Automobile Insurance Losses, Percentage of Collision Claims with Associated Injury Claims for 1974 and 1975 Models,* March 1977.

I 76-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* November 1977.

I 76-2 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1974, 1975, and 1976 Models,* September 1978.

I 77-1 *Automobile Insurance Losses, Injury Coverages; Claim Frequency Results for 1977 Models,* September 1978.

I 78-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results for 1977 and 1978 Models,* September 1979.

I 79-1 *Automobile Insurance Losses, Personal Injury Protection Coverages; Claim Frequency Results by Size of Claim for 1977, 1978, and 1979 Models,* October 1980.

A-1 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1972 and 1973 Models,* May 1974.

A-2 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1972 and 1973 Models,* September 1974.

A-3 *Automobile Insurance Losses, Collision Coverages; A Comparison of Results for 1973, 1974 and 1975 Models,* July 1975.

A-4 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Density, 1974 and 1975 Models,* December 1975.

A-5 *Automobile Insurance Losses, Collision Coverages; Relationships Between Losses and Vehicle Body Style, 1974 and 1975 Models,* December 1975.

A-6 *Automobile Insurance Losses, Collision Coverages; An Investigation of Relationships Between Losses and Engine Specifications, Using 1973 Models,* June 1976.

A-7 *Automobile Insurance Losses, Collision Coverages; Annual Increases and Seasonal Variations, 1972, 1973, 1974 and 1975 Models,* June 1976.

A-8 *Automobile Insurance Losses, Injury Coverages; A Preliminary Comparison of Results from Volkswagen Rabbits with Passive and Active Seat Belts, 1975 and 1976 Models,* June 1977.

A-9 *Automobile Insurance Losses, Collision Coverages; A Comparison of Collision Claim Size Distributions for 1974, 1975, and 1976 Models,* November 1977.

A-10 *Automobile Insurance Losses, Injury Coverages; Comparisons of Claim Frequencies of Volkswagen Rabbits with Automatic and Manual Seat Belts, 1975, 1976, and 1977 Models,* June 1979.

A-11 *Automobile Insurance Losses, Collision Coverages; The Consistency of the Loss Experience of Specific Vehicles Produced in Several Years, 1975 To 1978 Models,* June 1979.

A-12 *Automobile Insurance Losses, Collision Coverages; An Assessment of the Effects of the Federal Safety Bumper Standard on the Losses for 1972 Through 1978 Models,* June 1980.

A-13 *Automobile Insurance Losses, Personal Injury Protection and Collision Coverages; The Effects of Car Size on Crash Losses, 1977-1980 Models,* May 1981.

T79-1 *Automobile Insurance Theft Losses by Make and Series, 1979 Models,* June 1980.

T80-1 *Automobile Insurance Theft Losses by Make and Series; 1979 and 1980 Models.* April 1981.